

Appln. No.: 09/755,027

Reply to Office Action of April 26, 2006

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claims 1-71 (cancelled).

72. (Currently Amended) A mobile routing system, comprising:

a mobile node;

a plurality of sinks in a computer network, the plurality of sinks including a plurality of mobile routers; and

memory storing computer readable instructions, that, when executed by the processor, cause the routing system to perform a method that includes the steps of:

detecting movement of the mobile node between the plurality of sinks in the computer network; and

maintaining a connection by maintaining a stable IP address for the mobile node and sustaining, without packet loss, one or more active application sessions between the mobile node and one or more active peers upon detecting movement of the mobile node in accordance with a predefined reactive routing protocol, wherein the reactive routing protocol is extended by a proactive routing update for the one or more active peers upon detecting movement of the mobile node from an old sink to a new sink, and

wherein one or more replies to a route request sent from the new sink establishes a bi-directional, optimal path between the mobile node and one or more of the active peers.

73. (Previously Presented) The routing system of claim 72, wherein the reactive routing protocol includes an Ad-hoc On-Demand Distance Vector (AODV) protocol.

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74. (Canceled).

75. (Currently Amended) The routing system of claim ~~74~~73, wherein the mobile node transmits an initial message to the new sink with a destination sequence number set equal to a destination sequence number of a last registration reply that was distributed via the old sink.

76. (Currently Amended) The routing system of claim 75, wherein the new sink treats the message as an indication that the mobile node is requesting the new sink to act as the mobile node's ingress router in the ~~routing system~~ network.

77. (Currently Amended) The routing system of claim 76, wherein the new sink transmits an unsolicited route reply toward the old sink if ~~it~~ the new sink has an existing route toward the mobile node in a routing table of the new sink and if the destination sequence number is the same for the route as the one received from the mobile node in the initial message.

78. (Previously Presented) The routing system of claim 77, wherein the new sink sends a route request with a destination sequence number set to the same value as the sequence number received from the mobile node in the initial message.

79. (Previously Presented) The routing system of claim 78, wherein the old sink or a mobility router along a path to the old sink, responds with a route reply message.

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80. (Previously Presented) The routing system of claim 79, wherein the new sink sends an unsolicited route reply message for the mobile node destination with the route request source IP address set to the old sink and the destination sequence number incremented by one.

81. (Previously Presented) The routing system of claim 80, wherein the old sink and one or more mobility routers along the path to the old sink and one or more mobility routers along a path to the new sink are updated with a new route having a preferred destination sequence number.

82. (Previously Presented) The routing system of claim 81, wherein the old sink forwards packets destined to the mobile node along a route via the new sink.

83. (Previously Presented) The routing system of claim 82, wherein a route reply is sent from the old sink via the new sink to the mobile node to indicate that a handover procedure has been successful and wherein the new sink sends a route error to the mobile node if it cannot reach the old sink.

84. (Previously Presented) The routing system of claim 83, wherein the mobile node migrates a forwarding of datagrams from a link of the old sink to a link of the new sink.

85. (Previously Presented) The routing system of claim 84, wherein the mobile node determines an optimized path toward active peers by initiating route requests toward the active peers.

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86. (Previously Presented) The routing system of claim 85, wherein a source sequence number in the route request to an active peer is set equal to the new destination sequence number of the mobile node.

87. (Currently Amended) ~~The A mobile routing system, comprising: of claim 86,~~
a mobile node;
a plurality of sinks in a computer network, the plurality of sinks including a plurality of
mobile routers; and
memory storing computer readable instructions, that, when executed by the processor,
cause the routing system to perform a method that includes the steps of:
detecting movement of the mobile node between the plurality of sinks in the
computer network; and
maintaining a connection by maintaining a stable IP address for the mobile node
and sustaining, without packet loss, one or more active application sessions between the mobile
node and one or more active peers upon detecting movement of the mobile node in accordance
with a predefined reactive routing protocol,
wherein the reactive routing protocol includes an Ad-hoc On-Demand Distance Vector
(AODV) protocol,
wherein the routing system is further configured to extend the reactive protocol with a
proactive routing update for the one or more active peers upon detecting movement of the mobile
node from an old sink to a new sink,

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wherein the mobile node transmits an initial message to the new sink with a destination sequence number set equal to a destination sequence number of a last registration reply that was distributed via the old sink,

wherein the new sink treats the message as an indication that the mobile node is requesting the new sink to act as the mobile node's ingress router in the routing system network,

wherein the new sink transmits an unsolicited route reply toward the old sink if it has an existing route toward the mobile node in a routing table of the new sink and if the destination sequence number is the same for the route as the one received from the mobile node in the initial message,

wherein the new sink sends a route request with a destination sequence number set to the same value as the sequence number received from the mobile node in the initial message,

wherein the old sink or a mobility router along a path to the old sink, responds with a route reply message,

wherein the new sink sends an unsolicited route reply message for the mobile node destination with the route request source IP address set to the old sink and the destination sequence number incremented by one,

wherein the old sink and one or more mobility routers along the path to the old sink and one or more mobility routers along a path to the new sink are updated with a new route having a preferred destination sequence number,

wherein the old sink forwards packets destined to the mobile node along a route via the new sink,

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wherein a route reply is sent from the old sink via the new sink to the mobile node to indicate that a handover procedure has been successful and wherein the new sink sends a route error to the mobile node if it cannot reach the old sink,

wherein the mobile node migrates a forwarding of datagrams from a link of the old sink to a link of the new sink,

wherein the mobile node determines an optimized path toward active peers by initiating route requests toward the active peers,

wherein a source sequence number in the route request to an active peer is set equal to the new destination sequence number of the mobile node, and

wherein one or more replies to the route request establishes a bi-directional, optimal path between the mobile node and the one or more active peers.

88. (Currently Amended) The routing system of claim 72, wherein a mobile service router sink also acts as a proxy for mobility routing protocol exchanges between the mobile node and the network in that the mobile service router sink initiates a route request on behalf of the mobile node upon receipt of a datagram from the mobile node not compliant with an adhoc routing protocol applied in the computer network.

89. (Previously Presented) The routing system of claim 88, wherein the mobile node uses a Dynamic Host Configuration Protocol (DHCP) request as an initial message to the new sink.

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90. (Previously Presented) The routing system of claim 89, wherein the DHCP request includes the mobile node's IP address and authenticator.

91. (Previously Presented) The routing system of claim 90, wherein the mobile router sink maps the DHCP request to at least one of a RADIUS request or a DIAMETER request further sent to a mobile service manager for authentication.

92. (Previously Presented) The routing system of claim 91, wherein the mobile router sink initiates a route request on behalf of the mobile node upon receipt of a datagram from the mobile node.

93. (Previously Presented) The routing system of claim 92, wherein the mobile router sink buffers received datagrams until a path is established to a destination of the datagrams.

94. (Currently Amended) ~~The A mobile routing system, of claim 72 comprising:~~
a mobile node;
a plurality of sinks in a computer network, the plurality of sinks including a plurality of
mobile routers; and
memory storing computer readable instructions, that, when executed by the processor,
cause the routing system to perform a method that includes the steps of:
detecting movement of the mobile node between the plurality of sinks in the
computer network; and

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maintaining a connection by maintaining a stable IP address for the mobile node and sustaining, without packet loss, one or more active application sessions between the mobile node and one or more active peers upon detecting movement of the mobile node in accordance with a predefined reactive routing protocol,

wherein weights are assigned to neighbor hops in order to limit broadcast route requests when applying an expanding ring search algorithm in a reactive routing protocol.

95. (Previously Presented) The routing system of claim 94, wherein a weight for a hop can be administratively configured on a mobile router.

96. (Previously Presented) The routing system of claim 95, wherein a sum of weights from a source IP address of a request to the mobile router is used to select a path.

97. (Previously Presented) The routing system of claim 96, wherein mobile routers to which an expanding ring search route request is sent is limited to one or more mobile routers that have the lowest sum of weights from the source IP address of the request to a candidate neighbor mobile router.

98. (Previously Presented) The routing system of claim 72, wherein a source of a route reply is configured to initiate a gratuitous route reply toward the source in order to provide continuous streaming of datagrams for active application sessions.

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99. (Previously Presented) The routing system of claim 98, wherein the source of the route reply sends the gratuitous route reply if a life time of the route is expiring within a configured number of seconds and datagrams are received along a path between the mobile node and the one or more active peers.

100. (Currently Amended) ~~The A mobile routing system of claim 99, comprising:~~
a mobile node;
a plurality of sinks in a computer network, the plurality of sinks including a plurality of mobile routers; and
memory storing computer readable instructions, that, when executed by the processor, cause the routing system to perform a method that includes the steps of:
detecting movement of the mobile node between the plurality of sinks in the computer network; and
maintaining a connection by maintaining a stable IP address for the mobile node and sustaining, without packet loss, one or more active application sessions between the mobile node and one or more active peers upon detecting movement of the mobile node in accordance with a predefined reactive routing protocol,
wherein a source of a route reply is configured to initiate a gratuitous route reply toward the source in order to provide continuous streaming of datagrams for active application sessions,
wherein the source of the route reply sends the gratuitous route reply if a life time of the route is expiring within a configured number of seconds and datagrams are received along a path between the mobile node and the one or more active peers, and

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_____ wherein the configured number of seconds triggering gratuitous route reply from the route reply source is larger than a configured number of seconds left on the route lifetime triggering a new route request from the route request source.

101. (Currently Amended) ~~The~~ A mobile routing system of claim 99, comprising:

a mobile node;

a plurality of sinks in a computer network, the plurality of sinks including a plurality of mobile routers; and

memory storing computer readable instructions, that, when executed by the processor, cause the routing system to perform a method that includes the steps of:

detecting movement of the mobile node between the plurality of sinks in the computer network; and

maintaining a connection by maintaining a stable IP address for the mobile node and sustaining, without packet loss, one or more active application sessions between the mobile node and one or more active peers upon detecting movement of the mobile node in accordance with a predefined reactive routing protocol,

wherein a source of a route reply is configured to initiate a gratuitous route reply toward the source in order to provide continuous streaming of datagrams for active application sessions,

wherein the source of the route reply sends the gratuitous route reply if a life time of the route is expiring within a configured number of seconds and datagrams are received along a path between the mobile node and the one or more active peers, and

wherein the gratuitous route reply is unicast along a spanning tree created for active sessions towards a destination.